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IN THE U.S. PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	Appeal No.
Tadahiro OHMI et al.	Conf. 2418
Application No. 09/889,269	Group 1783
Filed March 5, 2002	Examiner C. Simone

METAL MATERIAL HAVING FORMED THEREON CHROMIUM OXIDE, PASSIVE FILM AND METHOD FOR PRODUCING THE SAME, AND PARTS CONTACTING WITH FLUID AND SYSTEM FOR SUPPLYING FLUID AND EXHAUSTING GAS

APPEAL BRIEF

MAY IT PLEASE YOUR HONORS:

(i) Real Parties in Interest

The real parties in interest in this appeal are Tadahiro OHMI of Miyagi-Ken, Japan and FUJIKIN INC. of Osaka, Japan.

(ii) Related Appeals and Interferences

Neither the appellant, appellant's legal representative nor does the assignee know of any other prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on

the Board's decision in the pending appeal.

(iii) Status of Claims

Claims 5, 6, 9, 13-16 and 18-21 remain pending in this application, from whose final rejection in the Office Action of May 11, 2011 ("Official Action") this appeal is taken.

Claims 1-4, 7, 8, 10-12 and 17 were cancelled.

(iv) Status of Amendments

The claims were last amended in the Amendment filed August 4, 2010, as set forth in the Claims Appendix.

(v) Summary of the Claimed Subject Matter

The claimed subject matter is described in the four independent claims 5, 6, 9 and 13.

Independent claim 5 describes a structure, comprising:

a metallic material having a surface, the metallic surface having a surface roughness (Ra) being not more than 1.5µm; and

(Specification page 6, lines 4-6)

a chromium-oxide passivation film providing an outermost surface, said chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium

film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

(Specification page 4, lines 1-7; page 8, lines 10-14; Figure 2 shows at least 100 nm thickness)

said chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface,

(Specification page 9, lines 8-10)

chromium of said baked chromium film which is not oxidized remains between said chromium-oxide passivation film and said metallic material, and said chromium remains adhered to the metallic material so that said chromium-oxide passivation film is coupled to said metallic material, and

(Specification page 6, lines 4-11; page 9, line 24 to page 10, line 2 and Figure 2)

said chromium-oxide passivation film has pin holes, and said pin holes are sealed.

(Specification page 10, lines 5-16)

Independent claim 6 describes an article, comprising:

a metallic body having a surface, the metallic body surface having a surface roughness (Ra) being not more than 1.5μm; and

(Specification page 6, lines 4-6)

a chromium-oxide passivation film providing an outermost surface, the chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

(Specification page 4, lines 1-7; page 8, lines 10-14; Figure 2 shows at least 100 nm thickness)

the chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface, and

(Specification page 9, lines 8-10)

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and the metallic material, and the chromium remains adhered to the metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

(Specification page 6, lines 4-11; page 9, line 24 to page 10, line 2 and Figure 2)

Independent claim 9 describes a structure, comprising:

a metallic body having a surface, the metallic body surface having a surface roughness (Ra) being not more than 1.5μm; and

(Specification page 6, lines 4-6)

a chromium-oxide passivation film providing an outermost surface, the chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

(Specification page 4, lines 1-7; page 8, lines 10-14; Figure 2 shows at least 100 nm thickness)

the metallic body surface defines a continuous boundary between the metallic body and the chromium-oxide deposit,

(Specification page 5, line 24 to page 6, line 2)

the chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface, and

(Specification page 9, lines 8-10)

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and the metallic material, and the chromium remains adhered to the

metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

(Specification page 6, lines 4-11; page 9, line 24 to page 10, line 2 and Figure 2)

Independent claim 13 describes a structure, comprising:

a metallic material having a surface, the metallic surface having a surface roughness (Ra) being not more than 1.5µm; and

(Specification page 6, lines 4-6)

a chromium-oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

(Specification page 4, lines 1-7; page 8, lines 10-14; Figure 2 shows at least 100 nm thickness)

at least approximately 30nm from an outermost surface of the chromium-oxide passivation film consisting of substantially 100% chromium-oxide, and

(Specification page 9, lines 8-10 and Figure 2))

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and

the metallic material, and the chromium remains adhered to the metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

(Specification page 6, lines 4-11; page 9, line 24 to page 10, line 2 and Figure 2)

(vi) <u>Ground of Rejection to be Reviewed on Appeal</u>

Whether claims 5, 6, 9, 13-16 and 18-21 would have been obvious within the meaning of 35 U.S.C. §103(a) over CARBO et al. U.S. Patent No. 4,507,339(CARBO) in view of UCHIDA et al. U.S. Patent No. 4,248,676 (UCHIDA) and OHMI US Patent No. 5,656,099(OHMI).

(vii) <u>Arguments</u>

<u>None of claims 5, 6, 9, 13-16 and 18-21 is obvious over CARBO in view of UCHIDA and OHMI.</u>

The structure of independent claim 5, the article of independent claim 6, the structure of independent claim 9 and the structure of independent claim 13 share the feature of a chromium-oxide passivation film formed a metallic surface having a surface roughness (Ra) being not more than 1.5μm.

The chromium-oxide passivation film comprises:

(i) substantially 100% chromium oxide approximately 30nm from its outermost surface, and

(ii) non-oxidized chromium adhered to the metallic surface to couple the passivation film to metallic surface.

This chromium-oxide passivation film results from a specific process which includes the steps described in each of these claims:

- coating directly onto the metallic surface a chromium film of at least 100 nm,
- baking the chromium film coated directly on the metallic surface at a temperature of 100-200°C,and
- heating the baked chromium film coated directly on the metallic surface in an oxidizing atmosphere.

CARBO was offered for teaching a structure and an article comprising a metallic material with a matte surface, which has been subjected to chromium/chromium oxide treatment.

The Examiner recognized that CARBO fails to suggest that the matte surface has a surface roughness as claimed or a passivation film formed on the surface has pin holes which have been filled.

UCHIDA and OHMI were offered for remedying these deficiencies for reference purposes.

The Examiner has maintained that it would have been obvious to

(1) fill pin holes in the passivation film of CARBO as taught by UCHIDA in order to prevent crack formations during general processing and

(2) use a chromium oxide as the passivation film in the combination of CARBO and UCHIDA as taught by OHMI because of the improved corrosion resistance gained by layer consisting only of chromium oxide.

The Examiner further concluded that since the passivation film consists of chromium oxide at least approximately 30 nm from an outermost surface of the chromium-oxide passivation film will consist of 100% chromium-oxide.

However, one would not have been able to approach the claimed structures and article based on CABO, UCHIDA and OHMI. These documents utilize different processes than the one described in the claims, which in turn, produce structures different from the claimed film structure.

The claims are separately argued according to the subheadings below.

Claim 5

Claim 5 is directed to a structure that comprises a metallic material having the above described surface onto which

the above described chromium oxide passivation film has been formed.

Claim 5 also specifies that the chromium-oxide passivation film has pin holes, and that the pin holes are sealed. As noted in the specification, pin holes, or vacancies, have been known to form in the coat film, but in the claimed method steps results in the sealing of such holes. See, e.g., page 11, lines 10-16 and 21-26.

The sealing results from the chromium oxide passivation film being formed on the metallic material surface by heating a chromium film coated directly onto the metallic material surface in an oxidizing atmosphere. While substantially 100% chromium oxide exists at least 30 nm from the outermost surface of the chromium oxide passivation film, non-oxidized chromium remains adhered to the metallic material. This non-oxidized chromium serves to couple the chromium oxide passivation film to the metallic material. As a result, any defects, e.g. pin holes, that develop in the oxidized chromium portion of the film will be sealed relative to the surface of the metallic material by the non-oxidized chromium. Thus, the problem of interface corrosion is solved, as discussed on page 6, lines 1-5 and page 9, lines 7-17 of the specification.

The proposed combination fails to render obvious claim 5 for at least three reasons:

I. The combination of CARBO and UCHIDA does not approach the claimed structure.

As noted above, the Examiner first asserted that it would have been obvious to <u>fill</u> the pin holes of the passivation film of CARBO as taught by UCHIDA in order to prevent crack formation.

However, CARBO and UCHIDA do not teach the claimed structure nor the claimed process that provides the claimed structure.

CARBO discloses steel with *"a chromium/chromium oxide surface treatment"*, wherein the <u>concentration</u> is defined as:

> *"The chromium in the oxide is present at about 0.5 to 2.0 mg per square feet and the chromium metal at about 3 to 13 mg per square foot."*

That is, this concentration appears at the outermost surface of the steel, and any pin holes resulting from the surface treatment in CARBO would be in this <u>chromium/chromium oxide layer</u>.

UCHIDA discloses filling holes of an electroplated <u>chromium layer</u> covering a metal surface using a <u>chromate</u> film, i.e., a layer of "trivalent chromium oxide and its hydrates, the trivalent chromium oxide sometimes being admixed with hexavalent chromium oxides and its hydrates" (column 2, lines 39-45). This film is about 1.6 to 100 nm (i.e. less than 0.1 micron, but not less than 0.0016, as noted in the Abstract).

As a result, the Examiner's structure based on CARBO and UCHIDA differs from the structure of claim 5 in at least the following features described in the table below:

Feature	Examiner's Structure	Claim 5
"providing an outermost surface" of structure	1.6 to 100 nm thick Chromate film (trivalent chromium oxide and its hydrates, the trivalent chromium oxide sometimes being admixed with hexavalent chromium oxides and its hydrates)	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromium/chromium oxide layer	Chromium
"pin holes are sealed"	Chromate film seals underlying pin holes of Chromium/chromium oxide layer	Chromium that remains sealed to metallic material seals pin holes formed in oxidized chromium.

II. One would not have combined the teachings of OHMI with CARBO/ UCHIDA.

The Examiner asserted that it would have been obvious to use chromium dioxide as the passivation film, as taught by OHMI, in the combination of CARBO and UCHIDA.

It appears that the Examiner suggested simply replacing the "chromium/chromium oxide surface treatment" with a chromium oxide film formed according to OHMI. This modification of the CARBO/UCHIDA combination, however, would have rendered the structure unsatisfactory for its intended purpose according to UCHIDA.

OHMI forms chromium oxide film on the surface of metallic material.

UCHIDA considers this type of direct formation of a chromate film, which includes chromium oxide and its hydrates, on the metal surface to be unacceptable for those metal surfaces that require subsequent surface treatment of an organic coating. The structures or cans of both CARBO and UCHIDA require organic coatings (in the paragraph bridging columns 2 and 3 of UCHIDA). For this reason, UCHIDA insists on first creating a <u>chromium</u> layer covered by the <u>chromate film</u> to cover pin holes (e.g., in the paragraph bridging columns 4 and 5 of UCHIDA).

Thus, in view of UCHIDA, one would have been discouraged from substituting the chromium oxide film of OHMI for the chromium/chromium oxide layer of the CARBO/UCHIDA combined structure as it is not suitable for treatment with an organic coating.

III. The combined teachings of CARBO/ UCHIDA plus OHMI do not teach the claimed structure.

Even if one had substituted the 100% chromium oxide film of OHMI for the "chromium/chromium oxide surface treatment" of CARBO in the CARBO/UCHIDA combined structure, the combination fails to teach an <u>outermost surface</u> formed by a chromium—oxide passivation film which has substantially 100% chromium oxide approximately 30 nm from the outermost surface and <u>chromium</u> adhered to the metallic material surface, wherein the chromium helps to couple the chromium-oxide passivaiton film to the metallic material surface.

First, as noted in reason **I**. above, the chromate layer of UCHIDA, which was proposed for sealing pin holes forms the <u>outermost surface</u>.

Second, the OHMI reference discloses the chromium oxide passivation film is formed from layers <u>within</u> the metallic material, i.e., the film is <u>integral</u> with the material, e.g. stainless steel. This is due to the fact that the oxidization process is executed after the electromechanical buffering. In the claimed invention, however, the oxidization process is executed <u>after coating chromium</u> directly onto the surface of the metallic material, e.g. stainless steel. As a result, the chromium oxide passivation film according to the OHMI reference is not the same as the one claimed.

Indeed, in the process of the OHMI reference, a "work strain layer consisting of fine crystals" must be formed. Then the electromechanical buffering is executed. In order to form a chromium passivation film layer on the surface by moving chromium atoms in the stainless steel, diffusion velocity of the chromium atoms becomes important. If the stainless steal is annealed without executing the electromechanical buffering, the diffusion velocity of the chromium atoms is low, and the chromium film layer cannot be clearly formed. That is to say that two layers (work strain layer consisting of fine crystals and oxidized chromium layer) are formed in the case of the OHMI reference at

the surface of the metallic material. See, e.g., column 2, lines 40-67 of the OHMI reference.

Thus, according to the OHMI reference there can be no chromium adhered to the metal surface, which is between the metal surface and the 100% chromium oxide layer. Instead, there is a "work strain layer" within the metallic material.

Consequently, the Examiner's combination of CARBO/UCHIDA/OHMI differs at least by the following features shown below:

Feature	Examiner's Structure	Claim 5
"providing an outermost surface" of structure	1.6 to 100 nm thick Chromate film (trivalent chromium oxide and its hydrates, the trivalent chromium oxide sometimes being admixed with hexavalent chromium oxides and its hydrates)	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromate film (surface of metallic material includes chromium oxide layer and work strain layer)	Chromium
Association between chromium oxide and metallic material	Chromium oxide layer is integral with metallic material.	Chromium oxide passivation film is coupled to metallic material.
"pin holes are sealed"	Chromate film seals underlying holes formed in chromium/chromium oxide surface of metallic material	Chromium that remains sealed to metallic material seals pin holes formed in oxidized chromium.

Therefore, the rejection of claim 5 should be reversed.

Claims 6 and 19

Claim 6 is directed to an article having similar features to the structure of claim 5, but claim 6 does not specify sealed pin holes. Similar to claim 5, the Examiner's proposed combination of CARBO, UCHIDA, and OHMI does not render obvious claim 6 for at least three reasons:

I. The combination of CARBO and UCHIDA does not approach the claimed article.

As detailed above relative to claim 5 (reason **I**) the rejection is based on covering the pin holes of the CARBO article, which has a chromium/chromium oxide layer on an outermost surface, with the chromate film of UCHIDA. However, CARBO and UCHIDA combined suggest a different article than that claimed with at least the following differences:

Feature	Examiner's Article	Claim 6
"providing an outermost surface" of article	1.6 to 100 nm thick Chromate film	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromium/chromium oxide layer	Chromium

II. One would not have combined the teachings of OHMI with CARBO/ UCHIDA.

Also detailed above relative to claim 5 (reason **II**) one of ordinary skill in the art would have been discouraged from replacing the coated chromium/chromium oxide layer of CARBO with the directly formed film of OHMI. UCHIDA considers the direct

formation of a film on the surface of a metal to be unacceptable for metal surfaces which are intended to receive an organic coating, i.e., the cans taught by CARBO and UCHIDA. Thus, the proposed modification would have rendered the cans of the CARBO/UCHIDA combination unsatisfactory for the intended purpose.

III. The combined teachings of CARBO/ UCHIDA plus OHMI do not teach the claimed article.

For similar reasons to those provided relative to the discussion above for claim 5 (reason **III**), the proposed combination does not teach the features of claim 6.

OHMI discloses the chromium oxide passivation film is formed from layers of the metallic material (work strain layer and chromium oxide layer), i.e., the film is <u>integral</u> with the material, e.g. stainless steel. As a result, the chromium oxide passivation film is not the same as one formed by coating a chromium film, baking the coated film, and heating/oxidizing the baked film, which results in a film that is <u>coupled</u> to a metallic material surface.

Consequently, the Examiner's combination of CARBO/UCHIDA/OHMI differs from the claim 6 in the following manner:

Feature	Examiner's Article	Claim 6
"providing an outermost surface" of article	1.6 to 100 nm thick Chromate film	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromate film is adhered to the surface of metallic material transformed into the chromium oxide layer.	Chromium
Association between chromium oxide and metallic material	Chromium oxide layer is integral with metallic material.	Chromium oxide passivation film is coupled to metallic material.

Therefore, the rejection of claim 6 (and claim 19 which depends from claim 6) should be reversed.

Claims 9 and 20

Claim 9 differs from claim 5 in that claim 9 does not specify sealed pin holes, and claim 9 refers to a metallic body (not material). Moreover, the surface of the metallic body in claim 9 is described as defining a continuous boundary between the metallic body and the chromium oxide deposit.

Accordingly, Claim 9 is also not rendered obvious by the Examiner's proposed combination for three reasons similar to those discussed above relative to claim 5:

I. The combination of CARBO and UCHIDA does not approach the claimed structure.

As detailed above relative to claim 5 (reason **I**) the rejection is based on covering the pin holes of the CARBO structure having a chromium/chromium oxide layer on an outermost surface, with the chromate film of UCHIDA. However, CARBO and UCHIDA combined suggest a different article than that claimed:

Feature	Examiner's structure	Claim 9
"providing an outermost surface" of structure	1.6 to 100 nm thick Chromate film	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromium/chromium oxide layer	Chromium
"defines a continuous boundary between the metallic body and chromium- oxide deposit"	Metallic surface	Metallic surface

II. One would not have combined the teachings of OHMI with CARBO/ UCHIDA.

Also detailed above relative to claim 5 (reason **II**) one of ordinary skill in the art would have been discouraged from replacing the coated chromium/chromium oxide layer of CARBO with the directly formed film of OHMI. UCHIDA considers the direct formation of a film on the surface of a metal to be unacceptable for metal surfaces which are intended to receive an organic coating, i.e., the cans taught by CARBO and UCHIDA. Thus, the proposed modification would have rendered the cans of the CARBO/UCHIDA combination unsatisfactory for the intended purpose.

III. The combined teachings of CARBO/ UCHIDA plus OHMI do not teach the claimed structure.

For similar reasons to those provided relative to the discussion above for claim 5 (reason **III**), the proposed combination does not teach the features of claim 9.

OHMI discloses the chromium oxide passivation film is formed from layers of the metallic material (work strain layer and chromium oxide layer), i.e. the film is <u>integral</u> with the material, e.g. stainless steel. As a result, the work strain layer, not stainless steel <u>surface</u>, forms a continuous boundary between the chromium dioxide and the stainless steel.

The Examiner's combination of CARBO/UCHIDA/OHMI is different from claim 9 in at least several ways as shown below:

Feature	Examiner's Structure	Claim 9
"providing an outermost surface" of structure	Chromate film	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromate film is adhered to the surface of metallic material transformed into the chromium oxide layer.	Chromium
"defines a continuous boundary between the metallic body and chromium- oxide deposit"	Work strain layer	Metallic surface
Association between chromium oxide and metallic material	Chromium oxide layer is integral with metallic material.	Chromium oxide passivation film is coupled to metallic material.

Therefore, the rejection of claim 9 and claim 20, which depend from claim 9, should be reversed.

Claims 13 and 21

Claim 13 differs from claim 5 in that claim 13 does not specify sealed pin holes, and claim 13 does not explicitly recite that the chromium-oxide passivation film provides the outermost.

Instead, claim 13 implicitly describes the chromium-oxide passivation film provides the outermost by reciting the steps involved in forming such a film. For example, the film is formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100 nm. This film is backed and subsequently heated in an oxidizing atmosphere. As a result, at least approximately 30nm from an outermost surface of the chromium-oxide passivation film consists of substantially 100% chromium-oxide.

The Examiner did not give weight to the product-by-process steps. However, the claimed process steps in combination with the claimed product features imply a structure that is different from the proposed combination of references.

Claim 13 is also not rendered obvious by the Examiner's proposed combination for three reasons similar to those discussed above relative to claim 5:

I. The combination of CARBO and UCHIDA does not approach the implied structure.

As detailed above relative to claim 5 (reason **I**) the rejection is based on covering the pin holes of the CARBO structure, which has a chromium/chromium oxide layer on an outermost surface, with the chromate film of UCHIDA.

In claim 13, however, the structural features include a chromium oxide passivation film, chromium is adhered to a metallic material to couple the film to the metallic material, and at least approximately 30nm from an outermost surface of the chromium-oxide passivation film consisting of substantially 100% chromium-oxide. An additional structural feature that is implied by the process steps is that the chromium-oxide passivation film is on the surface of the metallic material, i.e, "a chromium-oxide passivation film formed by coating directly onto the metallic material surface a chromium film…baking the chromium film…and heating…in an oxidizing atmosphere".

CARBO and UCHIDA combined suggest a different article than that claimed, including the following features compared below:

Feature	Examiner's structure	Claim 13
"formed by coating directly onto the metallic material surface"	Chromium/chromium oxide layer	Chromium oxide passivation film with substantially 100% chromium oxide approximately 30 nm from the outermost surface.
"adhered to the metallic material"	Chromium/chromium oxide layer	Chromium

II. One would not have combined the teachings of OHMI with CARBO/ UCHIDA.

Also detailed above relative to claim 5 (reason **II**) one of ordinary skill in the art would have been discouraged from replacing the coated chromium/chromium oxide layer of CARBO with the directly formed film of OHMI. UCHIDA considers the direct formation of a film on the surface of a metal to be unacceptable for metal surfaces which are intended to receive an organic coating, i.e., the cans taught by CARBO and UCHIDA. Thus, the proposed modification would have rendered the cans of the CARBO/UCHIDA combination unsatisfactory for the intended purpose.

III. The combined teachings of CARBO/ UCHIDA plus OHMI do not teach the claimed structure.

For similar reasons to those provided relative to the discussion above for claim 5 (reason **III**), the proposed combination does not teach the features of claim 13.

OHMI discloses the chromium oxide passivation film is formed from layers of the metallic material (work strain layer and chromium oxide layer), i.e., the film is <u>integral</u> with the material, e.g. stainless steel. As a result, the chromium oxide passivation film is not the same as one formed by coating a chromium film, baking the coated film, and heating/oxidizing the baked film. For example, it is the chromate film which is actually coated directly onto a surface of the metallic material, which has been transformed into the chromium oxide layer.

Consequently, the differences between the Examiner's combination of CARBO/UCHIDA/OHMI and claim 13 include:

Feature	Examiner's Structure	Claim 13
"formed by coating directly onto the metallic material surface"	Chromate film is coated onto the surface of metallic material transformed into a chromium oxide layer.	Substantially 100% Chromium oxide
"adhered to the metallic material"	Chromate film is adhered to the surface of metallic material transformed into a chromium oxide layer.	Chromium
Association between chromium oxide and metallic material	Chromium oxide layer is integral with metallic material.	Chromium oxide passivation film is coupled to metallic material.

Therefore, the rejection of claim 13 (and claim 21 which depends from claim 13) should be reversed.

Claims 14 and 15

Claims 14 depends from claim 5, and further specifies that the passivation film does not substantially include an element of the metallic material, which includes stainless steal as recited in claim 15.

As discussed in claim 5, one distinction between the claimed chromium oxide passivation film and the proposed combination is the resulting structure of chromium oxide layer relative to the metallic material.

The Examiner relies on the OHMI reference for teaching a chromium oxide passivation film formed on the surface of the metallic material. However, the film is actually <u>integral</u> with the material, as it is formed from the metallic material itself, whereas the claimed invention forms the passivation from a chromium film that has been directly coated on the metallic material surface, baked, and oxidized.

Accordingly, unlike the claimed invention, the OHMI reference forms passivation film which <u>includes</u> an element of the metallic material. In the process of the OHMI reference, a "work strain layer consisting of fine crystals" must be formed. Then the electromechanical buffering is executed. In order to form a chromium passivation film layer on the surface, chromium atoms in the stainless steel are diffused up to surface. As a result, the two layers (work strain layer consisting of fine crystals and oxidized chromium layer) formed includes an element of the metallic material in the case of the OHMI reference.

Therefore, the rejection of claim 14, and claim 15 which depends from claim 14, should be reversed.

<u>Claim 16</u>

Claim 16 depends from claim 14 and identifies the element of the metallic material which is not substantially included in the passivation film as Fe or Ni.

As discussed above relative to claim 14, the OHMI reference forms the chromium oxide passivation film from the outermost surface of the metallic material (not onto the surface as recited in claim 5 from which claim 16 ultimately depends). Accordingly, the chromium oxide passivation film of the OHMI reference, which includes a chromium oxide layer and a working strain layer, includes Fe or Ni as found in stainless steel, which is the metallic material used.

Thus, according the proposed combination of the Examiner, which included the substitution of the chromium oxide passivation film of the OHMI reference for the film of CARBO, does not render obvious claim 16.

Therefore, rejection of claim 16 should be reversed.

Claim 18

Claim 18 depends from claim 5. Claim 18 specifies that the film is crack-free.

As discussed in the specification on page 8, lines 3-7, the pre-treatment or baking of the coated chromium film prior to heating/oxidizing prevents the formation of cracks.

The combined documents do not teach the formation of a chromium oxide passivation film coupled to the surface of the metallic material by non-oxidized chromium, as discussed relative to claim 5, and, thus, they do not teach the formation chromium

oxide passivation film coupled to the surface of the metallic material, wherein the film is crack-free.

Therefore, rejection of claim 16 should be reversed.

Conclusion

From the foregoing discussion, it is believed to be apparent that the rejection on appeal are improper and should be reversed. Such action is accordingly respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any underpayment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

YOUNG & THOMPSON

/Robert A. Madsen/

Robert A. Madsen, Reg. No. 58,543
209 Madison Street, Suite 500
Alexandria, VA 22314
Telephone (703) 521-2297
Telefax (703) 685-0573
(703) 979-4709

RAM/lrs

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(viii) Claims Appendix

5. A structure, comprising:

a metallic material having a surface, the metallic surface having a surface roughness (Ra) being not more than 1.5μm; and

a chromium-oxide passivation film providing an outermost surface, said chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

said chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface,

chromium of said baked chromium film which is not oxidized remains between said chromium-oxide passivation film and said metallic material, and said chromium remains adhered to the metallic material so that said chromium-oxide passivation film is coupled to said metallic material, and

said chromium-oxide passivation film has pin holes, and said pin holes are sealed.

6. An article, comprising:

a metallic body having a surface, the metallic body surface having a surface roughness (Ra) being not more than 1.5μm; and

a chromium-oxide passivation film providing an outermost surface, the chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

the chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface, and

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and the metallic material, and the chromium remains adhered to the metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

9. A structure, comprising:

a metallic body having a surface, the metallic body surface having a surface roughness (Ra) being not more than 1.5μm; and

a chromium-oxide passivation film providing an outermost surface, the chromium oxide passivation film formed by coating directly onto the metallic material surface a chromium film having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

the metallic body surface defines a continuous boundary between the metallic body and the chromium-oxide deposit,

the chromium-oxide passivation film is substantially 100% chromium oxide approximately 30 nm from the outermost surface, and

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and the metallic material, and the chromium remains adhered to the metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

13. A structure, comprising:

a metallic material having a surface, the metallic surface having a surface roughness (Ra) being not more than 1.5µm; and

a chromium-oxide passivation film formed by coating directly onto the metallic material surface a chromium film

having a thickness of at least 100nm, baking the chromium film directly onto the metallic material surface at a temperature of 100°C to 200°C and heating the baked chromium film coated directly onto the metallic material surface in an oxidizing atmosphere, wherein,

at least approximately 30nm from an outermost surface of the chromium-oxide passivation film consisting of substantially 100% chromium-oxide, and

chromium of said baked chromium film which is not oxidized remains between the chromium-oxide passivation film and the metallic material, and the chromium remains adhered to the metallic material so that the chromium-oxide passivation film is coupled to the metallic material.

14. The structure according to claim 5, wherein said chromium-oxide passivation film does not substantially include an element of said metallic material.

15. The structure according to claim 14, wherein said metallic material is stainless steel.

16. The structure according to claim 14, wherein said element is Fe or Ni.

18. The structure according to claim 5, wherein said chromium-oxide passivation film is free from cracks.

19. The structure according to claim 6, wherein, said chromium-oxide passivation film has pin holes, and said pin holes are sealed.

20. The structure according to claim 9, wherein, said chromium-oxide passivation film has pin holes, and said pin holes are sealed.

21. The structure according to claim 13, wherein, said chromium-oxide passivation film has pin holes, and said pin holes are sealed.

(ix) Evidence Appendix

None.

(x) Related Proceedings Appendix

None.